MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2 2022/2023 (TERM ID 2220)

PEL0016 – ELECTRICITY AND MAGNETISM

(All sections / Groups)

4 JULY 2023
9:00 a.m – 11:00 a.m
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of six (6) pages with **FOUR** (4) questions only.
2. Answer all **FOUR** questions. All questions carry equal marks and the distribution of the marks for each question is given.
3. Please write all your answers in the Answer Booklet provided.

Question 1 (15 marks)

(a) Determine the magnitude of magnetic field, B in air at a point 5 meter from a long straight wire carrying a current of 15 A. [2 marks]

(b) Three parallel wires are located 2.5 meter from P respectively, where *Wire 1* has current, $I_1 = 2A$ flows into the page, *Wire 2* has current, I_2 with unknown value and *Wire 3* has current, $I_3 = 2A$ flows into the page as shown in **Figure Q1(a)**. Given the net magnetic field, B_{net} at point P is 4.12×10^{-7} T towards the positive-x direction:

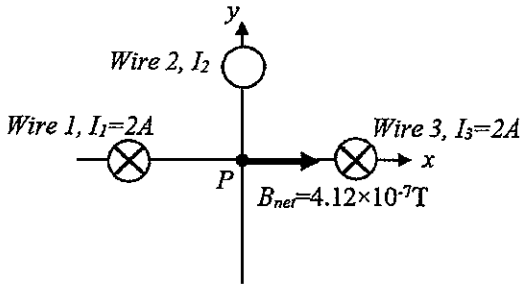

Figure Q1 (a)

(i) Sketch magnetic field, B direction at P due to the current from *Wire 1*, I_1 and the current from *Wire 3*, I_3. [2 marks]

(ii) Determine the direction of current flows in wire 2, I_2, (into the page/out of the page)? [1 mark]

(iii) Find the magnitude of current I_2? [2 marks]

(c) Determine the direction of the force, F between two parallel wires when both wires are carrying the current in the:

(i) same direction, (attract or repel)? [2 marks]

(ii) different direction, (attract or repel)? [2 marks]

(d) The uniform magnetic field intensity, B is perpendicular to a 10 cm diameter circular wire loop and has changed from 0.20 T to 0.10 T in 100 ms:

(i) Calculate the magnetic flux through the wire loop. [2 marks]

(ii) Find the emf induced in the loop. [2 marks]

Continued..

Question 2 (15 marks)

(a) Find the equivalent resistance, R_{eq} of the circuit in **Figure Q2 (a)** where $R_1 = 22\ \Omega$, $R_2 = 15\ \Omega$ and $R_3 = 100\ \Omega$. [3 marks]

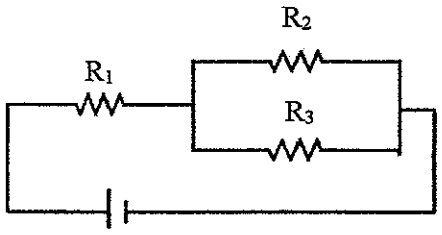

Figure Q2 (a)

(b) A 12 V battery, V_s is connected to the three resistors, $R_1 = 2k\ \Omega$, $R_2 = 4k\ \Omega$ and $R_3 = 6k\ \Omega$ as shown in **Figure Q2 (b)**.

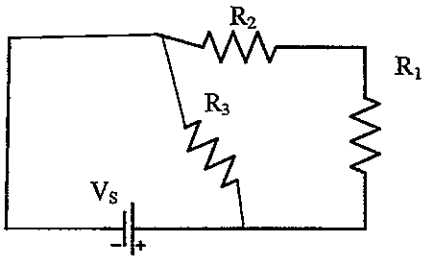

Figure Q2 (b)

(i) Find the equivalent resistor, R_{eq} of the circuit? [3 marks]

(ii) Calculate the current drawn from the battery. [2 marks]

(c) **Figure Q2 (c)** below shows a circuit diagram. Use Kirchhoff's Laws to determine the currents flowing in the circuit, I_1, I_2 and I_3? [7 marks]

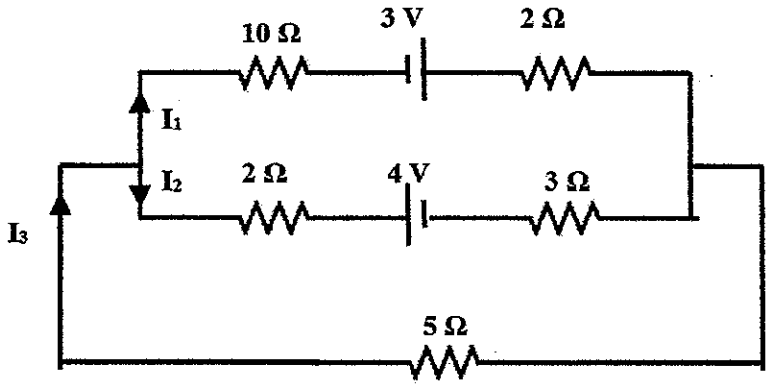

Figure Q2 (c)

Continued..

Question 3 (10 marks)

A series *RLC* circuit has a 60.0 Ω resistor, a 40.0 μF capacitor and a 50.0 mH inductor connected across an *ac* generator operating at 50.0 Hz and rms current of 0.12 A.

(a) Find the inductor reactance, X_L and the capacitor reactance, X_C. [2 marks]

(b) Determine the impedance, Z of the whole circuit. [1 mark]

(c) From (b), determine rms voltage source, V_{rms}. [1 mark]

(d) Sketch a phasor diagram of the *RLC* circuit. [2 marks]

(e) Determine the resistor voltage, V_R , the inductor voltage, V_L and the capacitor voltage, V_C. [3 marks]

(f) Using all values in (e), verify value of voltage source, V_{rms} obtain in (c). [1 mark]

Question 4 (10 marks)

(a) Define the following term:

(i) Depletion region [1 mark]

(ii) Valence band [1 mark]

(b) Sketch the atomic structure for intrinsic semiconductor after being doped with pentavalent atom. Label the atomic structure accordingly. [2 marks]

(c) **Figure Q4 (a)** shows an amplification circuit using a silicon bipolar-junction transistor (BJT). The voltage at base with respect to emitter terminal is V_{BE} = 0.7 V. If the direct current gain of the transistor is β_{DC} = 100, determine for the base current, I_B, the collector current, I_C and the voltage at collector with respect to emitter, V_{CE}. [6 marks]

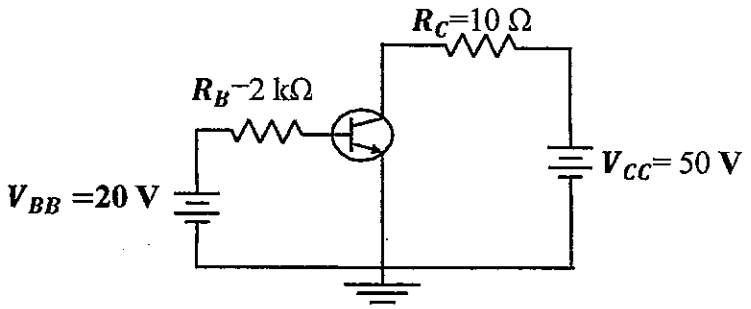

Figure Q4 (a)

End of questions.

APPENDIX 1

Physical Constants

Quantity	Symbol	Value
Electron mass	m_e	9.11×10^{-31} kg
Proton mass,	m_p	1.67×10^{-27} kg
Elementary charge	e	1.602×10^{-19} C
Gravitational constant	G	6.67×10^{-11} N.m^2/kg^2
Gas constant	R	8.314 J/K.mol
Hydrogen ground state	E_o	-13.6 eV
Boltzmann's constant	k_B	1.38×10^{-23} J/K
Compton wavelength	λ_c	2.426×10^{-12} m
Planck's constant	h	6.626×10^{-34} J.s
Speed of light in vacuum	c	3.0×10^8 m/s
Rydberg constant	R_H	1.097×10^7 m^{-1}
Acceleration due to gravity,	g	9.81 m /s^2
Atomic mass unit (1u)	u	1.66×10^{-27} kg
Avogadro's number	N_A	6.023×10^{23} mol^{-1}
Threshold of intensity of hearing	I_o	1.0×10^{-12} W /m^2
Coulomb constant	k	8.988×10^9 N m^2 /C^2
Permittivity of free space	ε_o/κ_o	8.85×10^{-12} C^2/N.m^2
Permeability of free space	μ_o	$4\pi \times 10^{-7}$ H/m

Energy equivalent of atomic mass unit:
One atomic mass unit (1.0 u) is equivalent to 931.5 MeV

APPENDIX II

List of formulas

$$A_v = \frac{V_c}{V_b}$$

$$\alpha_{dc} = \frac{\beta_{dc}}{\beta_{dc}+1}$$

$$\beta_{dc} = \frac{\alpha_{dc}}{1-\alpha_{dc}}$$

$$B = \frac{\mu_0 I}{2\pi r}$$

$$B = \mu_0 nI$$

$$\xi = V + Ir$$

$$\xi = blv$$

$$\xi = -N\frac{\Delta\Phi}{\Delta t}$$

$$\xi = -L\frac{dI}{dt}$$

$$\xi = -M\frac{dI}{dt}$$

$$F = BIL\sin\theta$$

$$F = qvB\sin\theta$$

$$\frac{F}{\ell} = \frac{\mu_0 I_1 I_2}{2\pi d}$$

$$f_r = \frac{1}{2\pi\sqrt{LC}}$$

$$I_{tot} = \sqrt{I_R^2 + (I_L - I_C)^2}$$

$$I = neA(v_n + v_p)$$

$$I = nev_d A$$

$$I = I_{max}\sin\omega t$$

$$I_{rms} = \frac{I_{max}}{\sqrt{2}}$$

$$I_x = \left(\frac{R_T}{R_x}\right)I_T$$

$$L = \frac{N\Phi_B}{I}$$

$$L = \frac{\mu_o N^2 A}{l}$$

$$M = \frac{N\Phi_B}{I}$$

$$M = \frac{\mu_o N_1 N_2 A}{l}$$

$$P = IV = I^2R = \frac{V^2}{R}$$

$$P_t = I_{rms}V_{rms}\cos\phi$$

$$P_r = V_{rms}I_{rms}\sin\phi$$

$$P_a = I_{rms}^2 Z$$

$$R = \frac{\rho L}{A}$$

$$R = R_0\left[1 + \alpha(T - T_0)\right]$$

$$R_T = R_1 + R_2 + R_3 + \ldots$$

$$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \ldots$$

$$r = \frac{mv}{Bq}$$

$$\tau = NBIA\sin\theta$$

$$U = \frac{1}{2}LI^2$$

$$U = \frac{1}{2}B^2 A\frac{l}{\mu_o}$$

$$V_H = Bvd$$

$$V = V_{max}\sin\omega t$$

$$V_{rms} = \frac{V_{max}}{\sqrt{2}}$$

$$V_x = \left(\frac{R_x}{R_T}\right)V_S$$

$$X_C = \frac{1}{2\pi fC}$$

$$X_L = 2\pi f L$$

$$Z = \sqrt{R^2 + (X_L - X_C)^2}$$

$$\oint B.dl = \mu_o I$$

$$d\mathbf{B} = \frac{\mu_O I}{4\pi}\frac{d\ell \times \hat{\mathbf{r}}}{r^2}$$

$$\Phi_B = BA\cos\theta$$

$$\cos\phi = \frac{R}{Z}$$

$$\tan\phi = \frac{X_L - X_C}{R}$$

End of Appendix

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FINAL EXAMINATION

TRIMESTER 2, 2022/2023

PIL0014 – INTRODUCTION TO LAW

(All sections / Groups)

4 JULY 2023
9.00 a.m. – 11.00 a.m.
(2 hours)

INSTRUCTIONS TO STUDENT:

1. This Question paper consists of 7 pages with 32 questions only excluding the cover page.

2. Answer **ALL** questions in Sections A, B and C. The distribution of marks for each question is given.

3. Please write all your answers in the Answer Booklet provided.

SECTION A – TRUE/FALSE QUESTIONS (30 MARKS)

1. Dr. Carrot enters into an agreement with her contractor to renovate her house at Presint 8, Putrajaya. Both parties agree that the renovation will be completed by June 2023. The contractor fails to follow the deadline. Dr. Carrot may initiate a legal action against the contractor under private law.

2. *Adat Temenggung* and *Adat Perpatih* are examples of written law.

3. The doctrine that separates the powers of three organs of the government in Malaysia is called the Doctrine of Separation of Powers.

4. Positive law is a basic concept of social justice which attempts to subvert natural law and create artificial equality through regulations or force.

5. At the First Reading of the legislative process, the Yang Di-Pertuan Agong has 30 days to give his royal assent by having the Public Seal affixed to the bill as affirmed in Article 66(4) of the Federal Constitution.

6. The Industrial Court is a quasi-judicial system tribunal which serves as an alternative to civil claims.

7. Miss Beetroot is dissatisfied with the manner in which her income has been assessed by the Inland Revenue Board of Malaysia (IRBM). She still has to pay her tax liabilities even though she has filed an appeal to the Special Commissioner of Income Tax.

8. The case of *Public Prosecutor v Sam Ke Ting (2022) 11 MLJ 190* is an example of a case under civil law.

9. The Native Court in Sabah is divided into a three-tier structure consisting of the Native Court, the District Native Court and the Native Court of Appeal.

10. All superior courts in Malaysia have original jurisdiction.

11. In criminal law, an accused who is found guilty of an offence is subject to custodial or non-custodial punishment.

12. Datin Cabbage recently filed a divorce petition after she found out that her husband was having an affair. As a plaintiff, she has to prove beyond reasonable doubt to win the case.

13. The Parliament can enact laws on matters enumerated in the Federal List based on List I of the Ninth Schedule of the Federal Constitution.

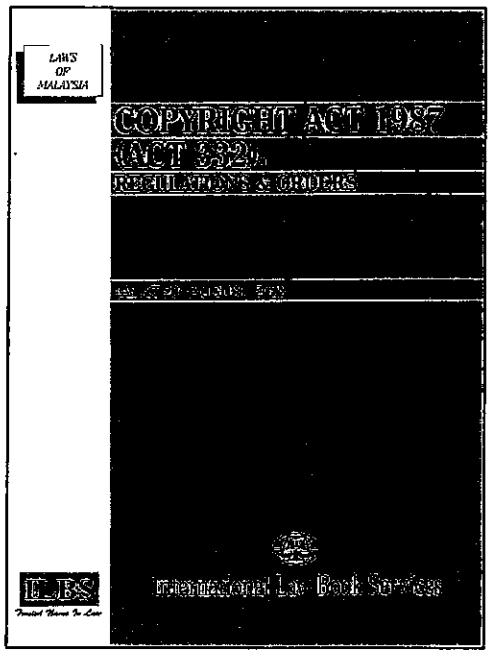
14. The Doctrine of Binding Judicial Precedent is applied horizontally when a judge in the Session Court bases his decision by following the decision made by a Judge in High Court.

15. No legal representation is allowed in any legal proceedings by the Martial Court.

Continued.....

SECTION B: MULTIPLE CHOICE QUESTIONS (30 MARKS)

16. An Act of Parliament is defined in _____.
    A. Article 4(1) of the Federal Constitution
    B. Article 160(2) of the Federal Constitution
    C. Article 153 of the Federal Constitution
    D. Article 8 of the Federal Constitution



Picture 1

17. Which of the following statements describe the law in *Picture 1*?
    A. It consists of an Act of Parliament and its subsidiary legislation.
    B. It is made by the State Legislative Assembly through the legislative process.
    C. It receives the royal assent from the Yang Di-Pertuan Agong.
    D. It covers both written and unwritten laws in Malaysia.

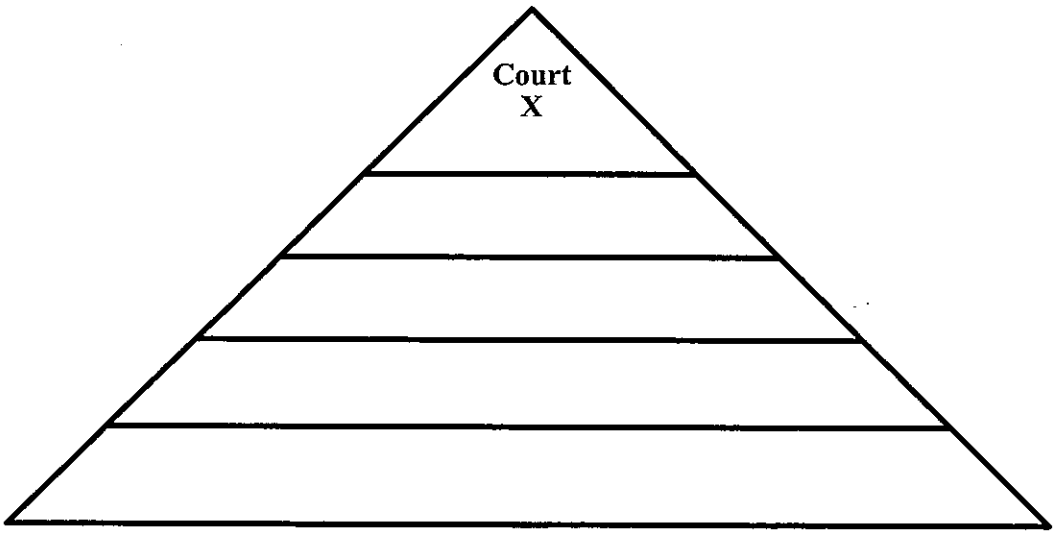
I.	The Executive
II.	The Judiciary
III.	The Legislative
IV.	The Legislation

Table 1

18. Based on *Table 1* above, the organs of the government are _____.
    A. I, II and III only
    B. II, III and III only
    C. I, III and IV only
    D. All of the above

Continued.....

19. Natural law can be defined as _____.
    A. law that applies to those people who are the subjects or citizens of the government that creates the law
    B. law made by a given government and it relies on the government for its power and must be written down
    C. law enforced by institutions such as police and judiciary because it prescribes what is right or wrong to the people.
    D. law with moral power which is not made by people and may not be recognised by a government



Picture 2

20. Referring to *Picture 2*, which of the following statement explains the original jurisdiction of **Court X**?
    A. The court has power to decide disputes between the federal and state governments.
    B. The court has power to determine appeals from decisions of the Court of Appeal or any subordinate courts.
    C. The court has unlimited original jurisdiction to hear and decide on any civil case of any value.
    D. The court can hear and determine any criminal cases involving death penalty and other very serious offences.

21. Mr. Apple wants to sue Tan Sri Celery to recover his due commission amounting to RM3,500. Which of the following court has the appropriate jurisdiction to try the matter?
    A. Labour Court
    B. Industrial Court
    C. Small Claims Court
    D. Employment Court

Continued.....

22. The House Buyers Claim Tribunal (TTPR) was established under the purview of the Ministry of Housing and Local Government. Which of the following statement is **CORRECT** to describe the jurisdiction of the Tribunal?
    A. The Tribunal may determine a claim where the total amount in respect of the claim does not exceed RM50,000.
    B. Any claim under the Tribunal is only limited to technical issues such as defective workmanship or materials.
    C. The Tribunal may determine a claim where the total amount in respect of the claim does not exceed 25,000.
    D. It has no jurisdiction to hear any claims filed within 12 months from the date of issuance of the certificate of completion.

I.	*Government of State of Sarawak v Dato' Sri Wong Soon Koh (2022)*
II.	*PP v Nagathevan A/L Manoharan & Ors (2008)*
III.	*Mohd Fitri bin Fauzi v Public Prosecutor (2020)*
IV.	*Chile v Bolivia (2016)*

Table 2

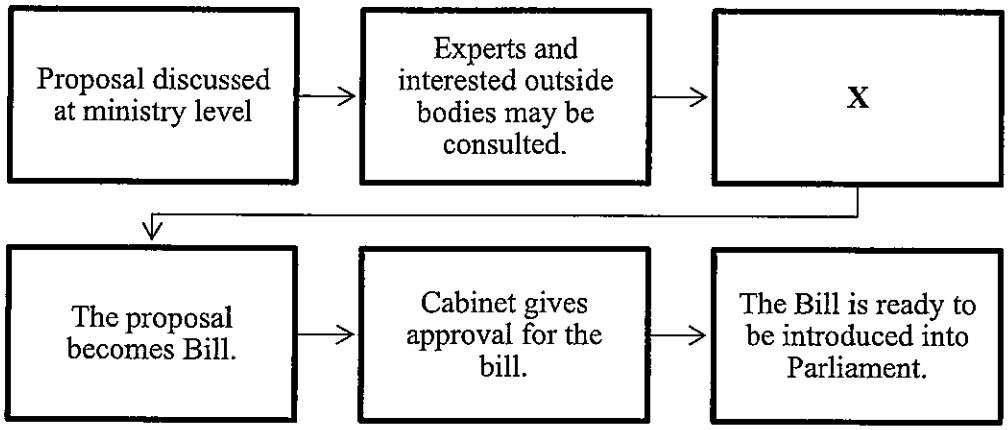
23. Based on *Table 2*, which of the following are examples of public law cases?
    A. I and II only
    B. II and III only
    C. III and IV only
    D. I and IV only

24. The following courts in Malaysia may apply the horizontal application of the Doctrine of Binding Judicial Precedent in making their decisions **EXCEPT**:
    A. Magistrates' Court
    B. High Court
    C. Court of Appeal
    D. Federal Court

25. In April 2023, Miss Watermelon bought a smart TV for RM6,000. When the seller delivered the product, she noticed a huge crack on the screen. Upon receiving her complaint, the seller refused to replace the TV or to repair the screen. Miss Watermelon wishes to take an action in the Consumer Claims Tribunal. Which of the following action is open to Miss Watermelon under the rules of the Tribunal?
    A. She may appoint a legal representative during her trial.
    B. She can claim up to RM 1 million.
    C. The seller may initiate the action under the Tribunal.
    D. She can file her claim against the seller until 2025.

Continued.....

26. Mr. Cucumber is a partner in a legal firm. He must be a member of _____.
    A. Malaysian Board of Engineers
    B. Malaysian Board of Architects
    C. Malaysian Bar
    D. Malaysian Institute of Accountants (MIA)


Proposal discussed at ministry level
Experts and interested outside bodies may be consulted.
X
The proposal becomes Bill.
Cabinet gives approval for the bill.
The Bill is ready to be introduced into Parliament.

Picture 3

27. *Picture 3* illustrates the pre-parliamentary legislative process in Malaysia. Which of the following statement is **CORRECT** to describe **X** in this process?
    A. The proposal will be sent to the Parliamentary Draft Person in the Attorney General's Chambers.
    B. The title of the Bill will be read and the text will be printed and distributed.
    C. Both Houses will debate on the principle.
    D. Votes will be taken in both Houses.

28. Any appeal against the decision made by the Industrial Court on error of law can only be done within _____ to the High Court.
    A. 40 days
    B. 30 days
    C. 20 days
    D. 14 days

29. Referring to the Armed Forces Act 1972, which of the following statements is **CORRECT** to describe the decision made by the Martial Court?
    A. The Court cannot try any offences punishable with death penalty.
    B. The Court has jurisdiction over any member of the various military forces in the Federation.
    C. Any capital punishment can only be sentenced by unanimous decision.
    D. The Court cannot try any offences committed outside Malaysia.

Continued.....

I.	RM90,622
II.	RM8,217
III.	RM1,110,031
IV.	RM2,873,905

Table 4

30. Based on *Table 4* above, which of the following amount stated falls within the civil jurisdiction of Magistrates' Court?
    A. I and II only
    B. II and III only
    C. III and IV only
    D. I and IV only

Continued.....

SECTION C: STRUCTURED QUESTIONS (40 MARKS)

31. Law can be classified into two broad divisions; namely, civil and criminal law. Explain any **FIVE (5)** differences between the civil law and criminal law.

(20 marks)

32. The hierarchy of courts comprises of the superior courts and the subordinate courts. Based on your understanding, explain the following:

a) the original and revisionary jurisdiction of High Court

(10 marks)

b) the original jurisdiction of Sessions Court

(10 marks)

[Total: 100 marks]

End of Page